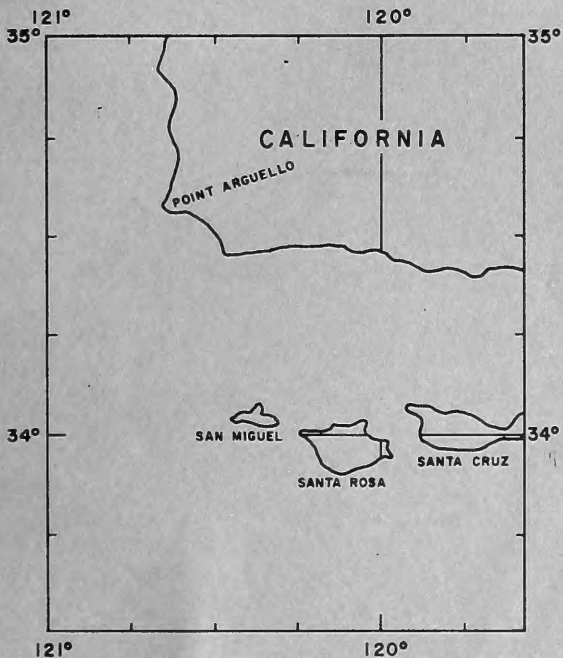




TR 201

# TECHNICAL REPORT

OCEANOGRAPHIC SURVEY RESULTS OFF POINT ARGUELLO, CALIFORNIA  
JANUARY AND NOVEMBER-DECEMBER 1964



FEBRUARY 1968



NAVAL OCEANOGRAPHIC OFFICE  
WASHINGTON, D.C. 20390

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## ABSTRACT

NAVOCEANO conducted two oceanographic surveys in the ocean area off Point Arguello, California, one in January and one in November-December 1964. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained.

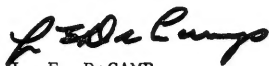
Parachute current drogues were principally used to describe current movement off Point Arguello. A strong westerly flow along the northern portion of Santa Barbara Channel was noted in the surface layers. A corresponding easterly flowing current also was noted in the southern portion of the channel.

The major features of the surface flow appeared to be a counterclockwise rotating eddy just off Point Arguello and a deflection of the California Current due to the influence of Rodriquez Dome.

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## FOREWORD

The ocean area off Point Arguello, California, offers an interesting environment for oceanographic study. The area is a region of interacting current regimes and water masses. NAVOCEANO conducted two environmental surveys off Point Arguello for the Pacific Missile Range in January and November-December 1964. The primary purpose of the surveys was to investigate the currents. This report presents some analyses of the data collected with most emphasis on the currents in the area.



L. E. DeCAMP  
Captain, U.S. Navy  
Commander





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## I. INTRODUCTION

The Naval Oceanographic Office (NAVOCEANO), conducted two environmental surveys aboard USS REHOBOTH (AGS 50) in the ocean area off Point Arguello, California, in January and November-December 1964. Both surveys were undertaken to provide oceanographic information to the Pacific Missile Range, Point Mugu, California. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained. Figure 1 shows the physiographic features of the Point Arguello area.

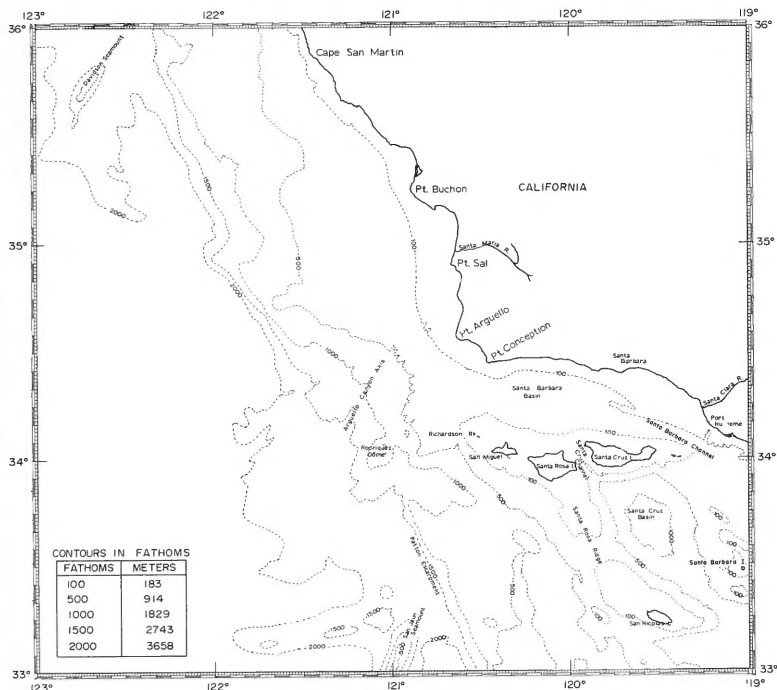


FIGURE 1. PHYSIOGRAPHIC FEATURES OF POINT ARGUELLO AREA

The ocean area off Point Arguello is quite complex as several North Pacific current regimes interact. It is a profound oceanographic and faunistic boundary between true Subarctic and Equatorial Waters. The area of the surveys is located inshore of the California Current system. This current system transports water southeastward from the West Wind Drift (off Alaska) to the North Equatorial Current (off Mexico). A subsurface countercurrent below 200 meters (660 feet) is present close to the coast throughout the year. As upwelling ceases in the winter and the character of the prevailing winds changes,

a surface countercurrent, the Davidson Current, develops. This Davidson Current flows northwestward along the coast within about 80 miles of the California coast.

Surveys of the California Current system, carried out under the California Co-operative Oceanic Fisheries Investigation (CCOFI) Program (Scripps, 1949-64), repeatedly touched the area covered by the 1964 surveys, but the sampling grids employed by CCOFI surveys were too coarse to delineate small scale features.

## II. NARRATIVE OF OPERATIONS

### A. January 1964.

REHOBOTH occupied 19 oceanographic stations along 5 lines radiating from the coast of California beginning 21 January (Fig. 2). From Nansen casts, serial-depth temperature and salinity measurements were obtained, and water samples were collected for analysis of salinity and dissolved oxygen, phosphate, and silicate. Additionally, 16 cores,

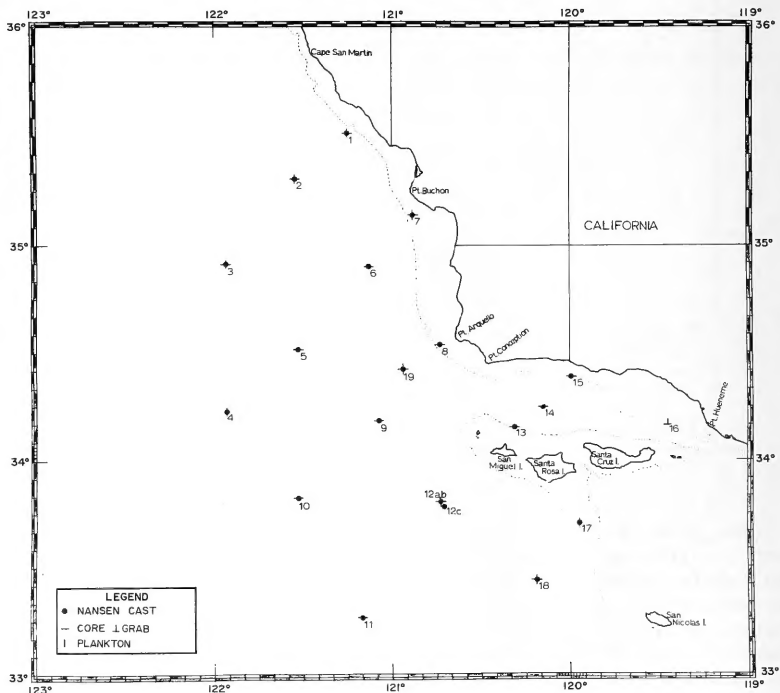


FIGURE 2. OCEANOGRAPHIC STATION LOCATIONS, JANUARY

2 parts of cores, 1 bottom grab sample, 27 bathythermograms (BT's), and 9 surface and 2 vertical plankton samples were collected on selected stations. A total of 274 drift cards was released. The observations made at each station are tabulated in Table I.

From 25 to 28 January, 19 parachute current drogues were launched and tracked.

#### B. November-December 1964.

REHOBOTH reoccupied the 19 stations taken in January between 25 November and 10 December (Fig. 3). Serial-depth temperature, salinity, and dissolved oxygen measurements were obtained with Nansen casts. Additionally, 10 cores and 4 surface plankton samples were collected at selected stations. The observations made at each station are tabulated in Table II. During this same period, 28 parachute current drogues were launched and tracked, and a total of 22 BT's was obtained.

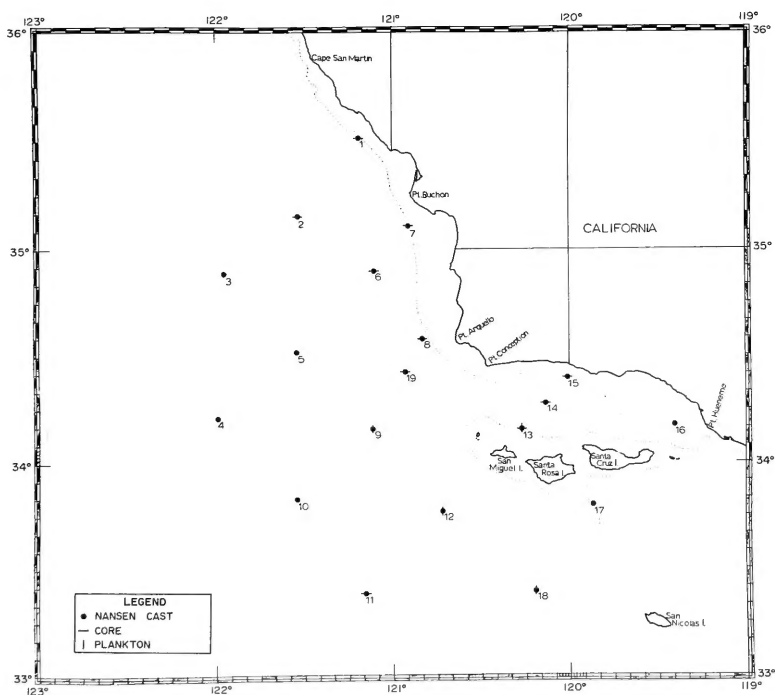


FIGURE 3. OCEANOGRAPHIC STATION LOCATIONS, NOVEMBER-DECEMBER

TABLE 1. STATION SUMMARY  
JANUARY

STATION consec.	STATION NUMBER assign.	SONIC DEPTH (Meters)	CAST DEPTH (Meters)	OXYGEN	PHOSPHATE	SILICATE	PLANKTON	BOTTOM SEDIMENT	DRIFT CARDS	BT'S
1	1	333	291	+	+	+	Horz/Vert	KC1		2
2	2	796	443	+	+	+	Horz/Vert	KC2	10	
3	3	2085	1308				Horz	KC16	10	1
4	4	3737	1604				Horz		26	3
5	5	2195	2071	+	+	+		KC3	10	2
6	6	550	486	+	+	+		KC4	10	2
7	7	132	99	+	+	+	Horz	KC5		2
8	8	102	70	+	+	+		KC6	12	2
9	19	896	733	+	+	+	Horz	KC7		2
10	9	1930	1442	+	+	+		KC8	18	3
11	10	3365	2702	+	+	+		KC9	10	2
12	12A	1840	392	+	+	+	Horz	KC10	10	
13	12B	2015	477	+	+	+		BS1	24	
14	16	175	100	+	+	+		BS2	10	
15	14	530	357			+		KC11	14	
16	13	210	170	+	+	+		KC12	20	
17	15	293	250	+	+	+		KC13	10	
18	12C	1970	1343	+	+	+				2
19	11	3280	2947	+	+	+	Horz	KC14	41	1
20	18	1120	782	+	+	+	Horz	KC15	19	3
21	17	137	125					BS3	20	

TABLE II. STATION SUMMARY  
NOVEMBER-DECEMBER

STATION consec.	NUMBER assign.	SONIC DEPTH (Meters)	CAST DEPTH (Meters)	OXYGEN	PLANKTON	BOTTOM SEDIMENT
1	16	70	60	+		
2	17	183	162	+		
3	18	1180	686	+	Horz	
4	12	1940	918	+	Horz	
5	11	3510	473	+		KC1
6	8	110	105	+		KC2
7	19	885	656	+		KC3
8	9	2000	1693	+	Horz	
9	10	3380	2941	+		
10	4	3594	3227	+		
11	5	2377	1816	+		
12	3	2290	1862	+		
13	2	568	490	+		KC4
14	1	254	200	+		KC5
15	7	146	139	+		KC6
16	6	545	489	+		KC7
17	13	366	238	+	Horz	KC8
18	14	530	341	+		KC9
19	15	77	60	+		KC10

C. Participating Personnel.

NAVOCEANO personnel participating in the surveys were as follows:

January 1964 Survey

G. H. Knoop (Senior Scientist)  
R. P. Kopenski  
R. W. Thomas  
R. A. Stewart  
L. S. Jordan

November-December 1964 Survey

R. W. Thomas (Senior Scientist)  
R. K. Oser  
R. M. Heavers  
S. W. Dorey  
L. S. Jordan

### III. METHODS AND PROCEDURES

#### A. Instrumentation and Data Collection.

Serial-depth temperature, salinity, and dissolved oxygen data were obtained by standard Nansen cast techniques. Paired protected and unprotected deep sea reversing thermometers were placed on the Nansen bottles for in situ temperatures. Water samples were drawn from the Nansen bottles for chemical analyses.

On the January survey, water samples for dissolved oxygen, phosphate, and silicate analyses were drawn at the stations located within a 50-mile radius of Point Arguello. The phosphate and silicate samples were frozen for later analysis at NAVOCEANO.

On both surveys, temperature measurements were made periodically with mechanical BT's. BT data were forwarded to the National Oceanographic Data Center (NODC) for processing.

The bottom sediment samples were obtained by means of a Kullenberg corer and an orange peel sampler at the stations shown in Figures 2 and 3. The cores were protected against desiccation by coating the core liners in a specially constructed wax bath.

Surface plankton hauls (Figs. 2 and 3) were obtained with a half-meter net, mesh size #0, as the ship drifted on station. For vertical hauls, the same net was lowered to 200 meters and retrieved. The samples were preserved and shipped to the NAVOCEANO biological laboratory for analysis.

Parachute current drogues, with the parachute at either 50, 300, 500, or 1,000 feet (15, 90, 150, or 305 meters), were released and tracked. Positioning of the drogues on the January survey was by radar range and bearing. Because of new requirements on the ship's time, drogue observations were abridged. Drogue positions were determined chiefly by Lorac on the November-December survey, but, since Lorac coverage did not extend north of Point Arguello, radar was used for some positions.

#### B. Methods of Analyses and Disposition of Data.

Reversing thermometer temperatures were read to  $\pm 0.01^{\circ}\text{C}$  and corrected by standard methods.

Salinities were analyzed aboard ship with a conductive salinity bridge during the January survey and an inductive salinometer during the November-December survey.

Dissolved oxygen concentrations were determined aboard ship using a modified Winkler titration method.

The phosphate and silicate samples were analyzed by spectrophotometric methods at the NAVOCEANO chemical laboratory. Unfortunately, the values obtained are questionable since the samples partially thawed during shipment. There is no discussion of these data in this report.

The physical and chemical oceanographic data were coded and forwarded to NODC for processing by electronic computer. Machine computations provided temperature, salinity, and dissolved oxygen interpolations at standard depths, in addition to density ( $\sigma_t$ ), specific volume and dynamic depth anomalies, and sound velocity calculations. The phosphate and silicate concentrations at observed depths were added to the computation listings. Listings of these data are on file at NODC under cruise reference numbers 31268 for January and 31216 for November-December.

At the conclusion of both surveys the bottom sediment samples were shipped to the Bureau of Mines facility at Tiburon, California, where NAVOCEANO personnel analyzed them for engineering properties. Sub-samples were forwarded to the NAVOCEANO geological laboratory for sediment size and composition determination. Core analysis summary sheets of engineering properties and sediment size and composition are on file at NAVOCEANO under Laboratory Item 227 for January and Item 242 for November-December. The grab sample and the two parts of cores from the January survey were not analyzed. Log sheets of the bottom sediment data from both surveys are presented in the appendix. Since bottom sediment distribution has been amply covered by other works (e.g., Emery, 1960). The sediment data are not discussed in this report.

The BT data are on file at NODC under reference number 08382 for January and 08383 for November-December.

Results from the drift card releases have not been obtained.

At NAVOCEANO, the plankton samples were filtered through cotton cloth. The volume of each wet sample was read in a graduated cylinder and water added to the 100cc level. Aliquots of 2cc were drawn while stirring the sample. A sufficient number of aliquots were removed to include 4 to 20 percent of the sample, depending on the total volume of plankters involved. The type and number of plankters from the January and November-December surveys are tabulated in the appendix.

Parachute current drogue tracks were plotted and are included in this report. Average velocities were computed to the nearest tenth of a knot for each observation interval. Current drogue summary sheets are presented in the appendix.

#### IV. ANALYSIS AND RESULTS

##### A. Temperature.

During the January survey, surface temperatures were cooler offshore with the isotherms oriented almost north-south (Fig. 4). At depths below 100 meters (330 feet), temperatures decreased seaward with the isotherms paralleling the bottom topography. Figure 5 shows horizontal temperature distribution at 200 meters (660 feet).

A more complex, and essentially opposite, distribution of temperature developed during the November-December survey. Surface temperatures increased seaward with a lobe of cooler water extending south from Point Arguello (Fig. 6). Warmer water occurred along the northern side of Santa Barbara Channel. A similar pattern existed at 200 meters (Fig. 7). Station 9 exhibited anomalously low temperatures at all depths below 100 meters.

##### B. Salinity.

Surface salinities in January were higher nearshore with an ill-defined lobe of more saline water extending south and west from Point Arguello (Fig. 8). A small salinity range of about .02‰ existed below 100 meters, but generally, the lower values were to the south and east.

Surface salinities during the November-December survey decreased seaward (Fig. 9). The range of salinity values was again small below 100 meters, but higher values occurred in the Santa Barbara Basin and at the outer stations southwest of Point Arguello.

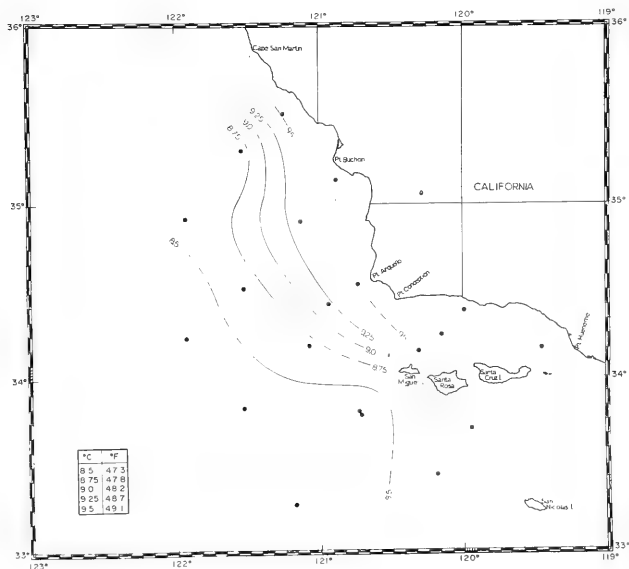
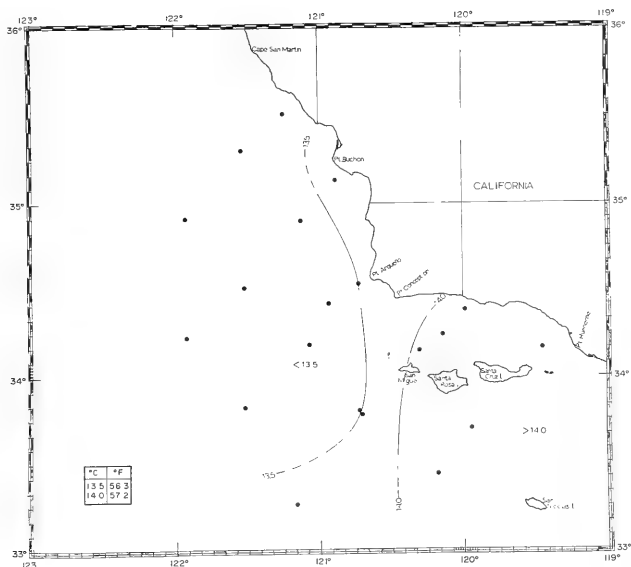
##### C. Dissolved Oxygen.

In January, dissolved oxygen distribution below 100 meters indicated a wedge of relatively low oxygen content water extending toward Point Arguello from the southwest. During the November-December survey, this same low oxygen wedge existed, although displaced slightly to the north. In the Santa Barbara Basin, low dissolved oxygen content values existed below sill depth during both surveys.

##### D. Currents.

1. Tides. A mixed tide with a mean range of 3.7 feet characterizes the Point Arguello area. The diurnal range is less than 5.4 feet, and the extreme range, attained during the spring tides of the solstices, is 8.8 feet (USC&GS, 1964).

The tide wave moves from southeast to northwest at such a rate that high tide reaches Point Buchon about 30 minutes after passing Port Hueneme. The associated currents theoretically reach their



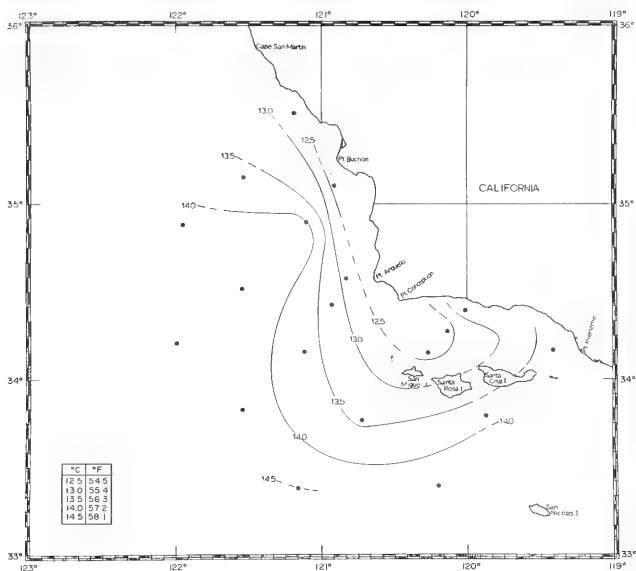


FIGURE 6. SURFACE TEMPERATURE DISTRIBUTION (°C), NOVEMBER-DECEMBER

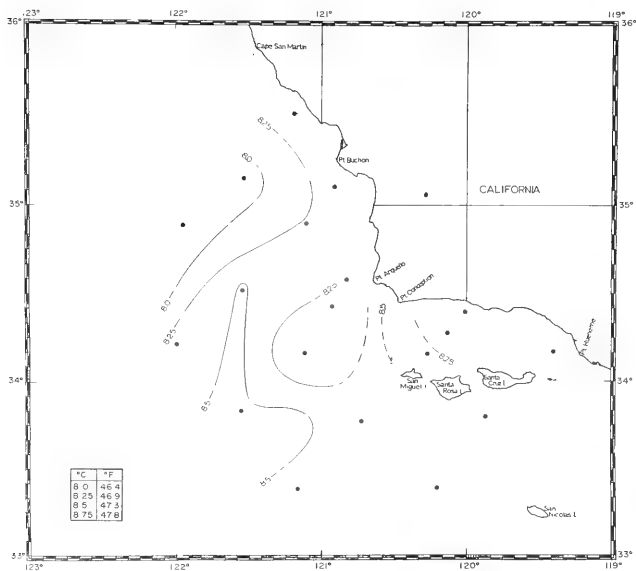


FIGURE 7. TEMPERATURE DISTRIBUTION (°C) AT 200 METERS, NOVEMBER-DECEMBER

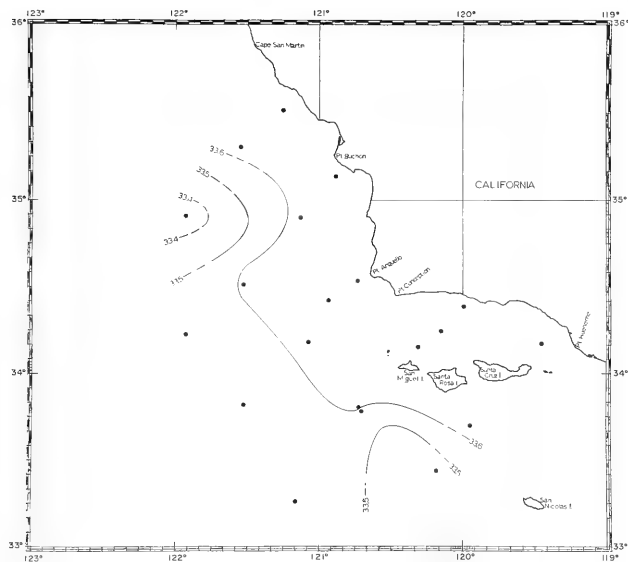


FIGURE 8. SURFACE SALINITY DISTRIBUTION (‰), JANUARY

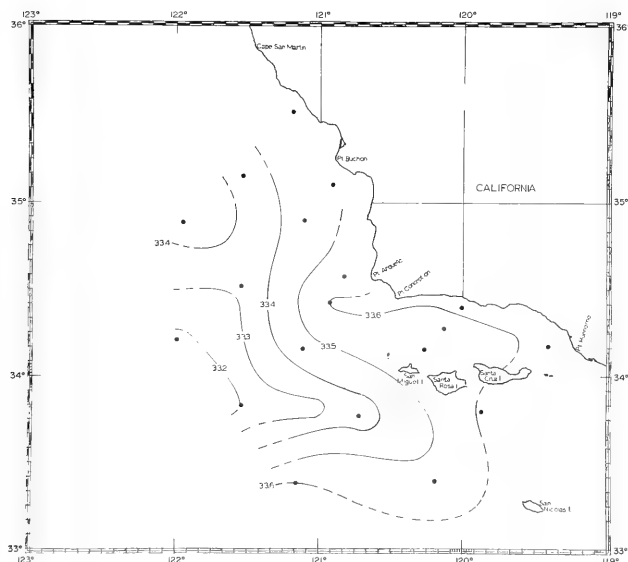


FIGURE 9. SURFACE SALINITY DISTRIBUTION (‰), NOVEMBER-DECEMBER

maximum velocities between high and low tide and rarely exceed 0.5 knot. On the open shelf, tidal currents are rotary in a clockwise manner and make a complete cycle in about 12.4 hours. Boundary conditions near the shore and at the bottom, however, confine the tidal current largely to directions parallel to shore or bottom contours.

2. Parachute Current Drogues. The tracks of the parachute current drogues released in January are shown in Figure 10. Twelve of the drogues had the parachute at 50 feet, four at 300 feet, and three at 1,000 feet.

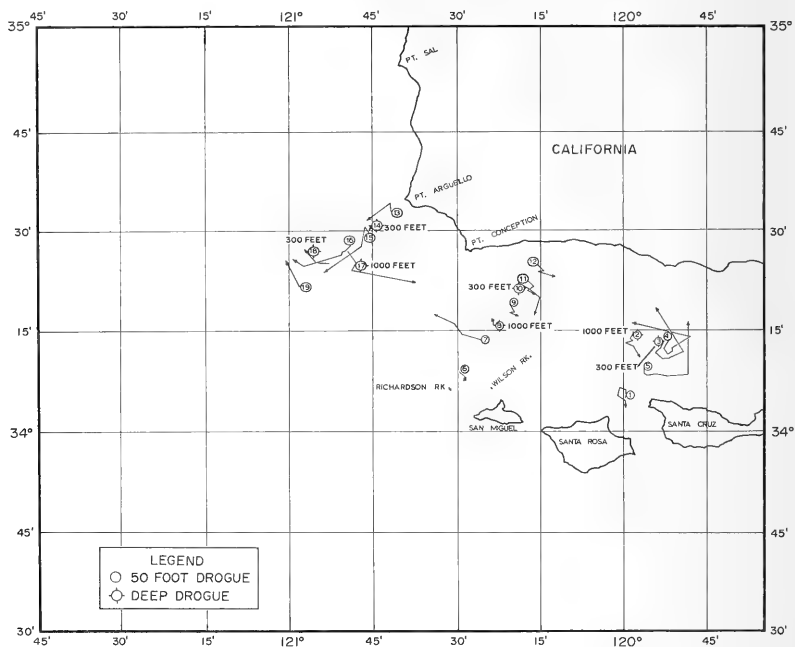


FIGURE 10. PARACHUTE CURRENT DROGUE MOVEMENT, JANUARY

The 50-foot drogues released in a line radiating southwest from Point Arguello indicated southwestward flow nearshore and a northerly flow near 121°W longitude. The 300-foot drogues followed a similar, but less pronounced, movement. The 1,000-foot drogue apparently lost its parachute and became influenced by prevailing winds.

The drogues along the northern entrance to Santa Barbara Channel revealed mixed flow directions. Those near the coast moved generally eastward, but they exhibited a period of westward flow, probably the

result of tidal currents. The drogues in the center of the channel entrance showed a westward outflow from the channel. The most southern drogue suggested a weak eastward flow.

In Santa Barbara Channel, north of Santa Cruz Island, the drogues revealed a counterclockwise, eddy-type flow. The drogue released near the entrance to Santa Cruz Channel showed a counterclockwise flow that was displaced into the channel.

The tracks of the drogues released during the November-December survey are shown in Figure 11. Twenty-two of the drogues had parachutes at 50 feet, one at 300 feet, and five at 500 feet.

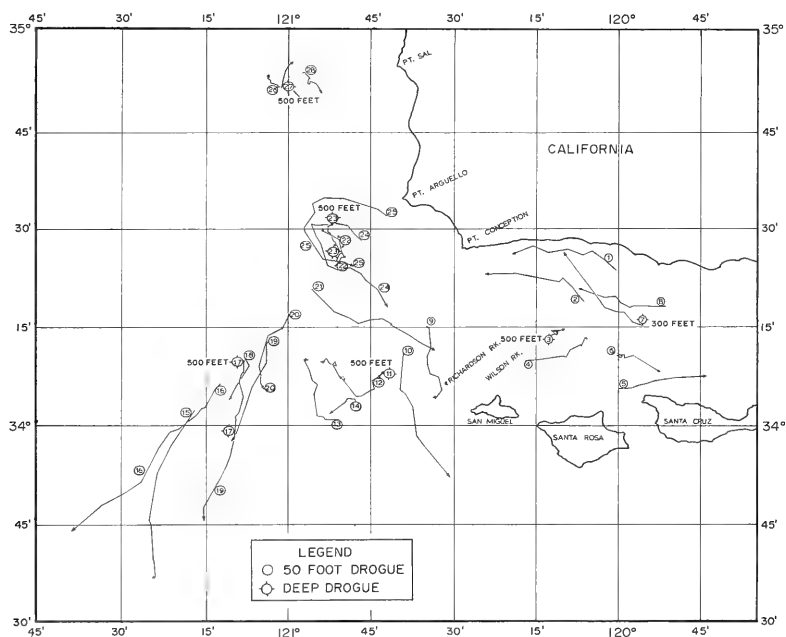


FIGURE 11. PARACHUTE CURRENT DROGUE MOVEMENT, NOVEMBER-DECEMBER

On this survey, three drogues were launched north of Point Arguello, off Point Sal. The two drogues at 50 feet moved in opposite directions. The 500-foot drogue, launched between the 50-foot drogues, moved northward, turning northeastward.

Southwest of Point Arguello, drogue patterns indicated a counterclockwise rotating eddy that was centered about 15 miles from shore. Flow from the southern edge of this eddy appeared to be eastward. As the drogues moved to the east, a southern component became apparent, similar to the pattern displayed by drogues released near the entrance to Santa Barbara Channel.

Farther south, along the line extending southwest from Point Arguello, the drogues showed a definite southwest flow pattern. Between this southwest flow and the southward flow near the entrance to Santa Barbara Channel, drogues displayed a northwestward component, indicating a probable eddy.

The drogues in Santa Barbara Channel described a mixed flow. The drogues along the north side of the channel indicated a strong westward current, whereas the drogues along the south side indicated an equally strong eastward current.

The effect of tidal currents on drogues is difficult to ascertain on both the January and November-December surveys because of the large time lapses between navigational fixes. Also, other factors, such as drag, prevailing winds, and localized eddies will influence drogue movement.

3. Geostrophic Currents. Surface dynamic topographies were contoured relative to the 200-meter (660 feet) and 500-meter (1640 feet) reference levels, and the topography at 200 meters was contoured relative to the 500-meter level. The 200-meter reference level was selected because it utilized a maximum amount of the data, and the 500-meter level was selected because it facilitated a comparison to the literature. In computing and analyzing the dynamic data, the major assumptions were that the reference level had no net motion, the flow was in a steady state, and the data were synoptic.

For the January survey, surface dynamic topographies indicate a counterclockwise rotating system southwest of Point Arguello (Fig. 12). North of this system, topographies show a northward movement, and to the south, a southeastward movement. The topography at 200 meters indicates flow to the north with the isobars paralleling the bottom contours (Fig. 13).

For the November-December survey, surface dynamic topographies indicate a southerly flow along the coast, turning eastward off Point Arguello (Fig. 14). The topography at 200 meters is poorly defined, but a northward flow, north of Point Arguello, and a southeasterly flow, south of the islands, are indicated (Fig. 15).

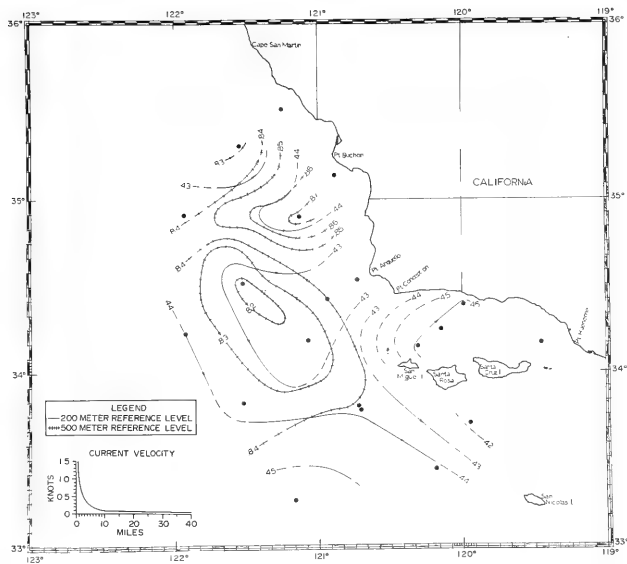


FIGURE 12 DYNAMIC TOPOGRAPHIES (0-DECIBAR SURFACE), JANUARY

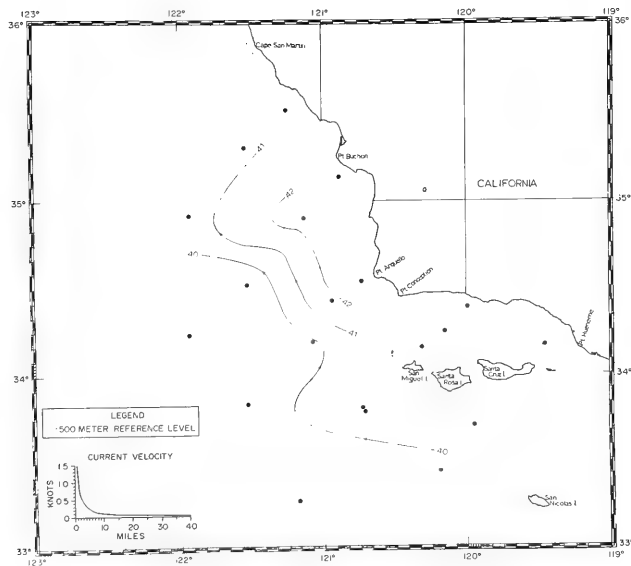


FIGURE 13 DYNAMIC TOPOGRAPHIES (200-DECIBAR SURFACE), JANUARY

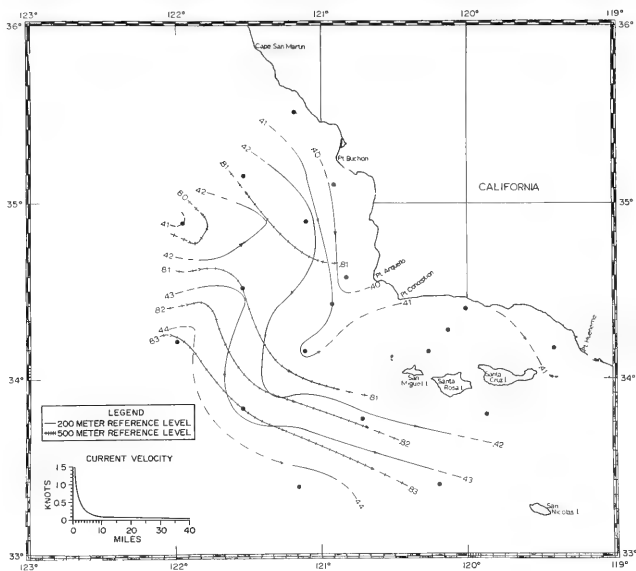


FIGURE 14 DYNAMIC TOPOGRAPHIES (0-DECIBAR SURFACE), NOVEMBER-DECEMBER

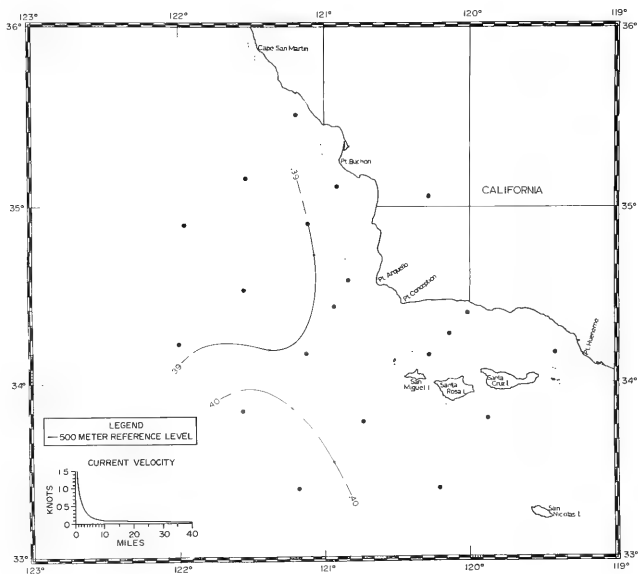


FIGURE 15 DYNAMIC TOPOGRAPHIES (200-DECIBAR SURFACE), NOVEMBER-DECEMBER

## V. SUMMARY AND CONCLUSIONS

From analysis of these and other data, the flow pattern indicated in Figure 16 is believed to exist in early winter in the Point Arguello region.

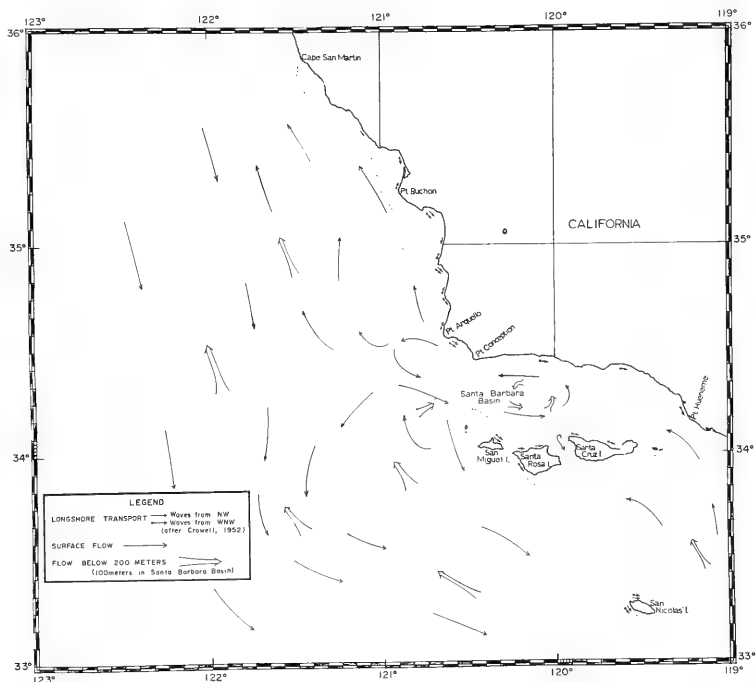


FIGURE 16. WINTER CIRCULATION

A strong westerly flow along the northern portion of Santa Barbara Channel exists in the surface layers. A corresponding easterly flowing current is developed in the southern portion of the channel. Although some water is discharged southward through Santa Cruz Channel, a larger inflow of surface waters enters between Port Hueneme and Santa Cruz Island.

North of Point Arguello, the northward flowing Davidson Current forms during November and December, and by January it is well developed. West of the Davidson Current, the California Current flows southward.

Southwest of Point Arguello, a complex series of eddys and meanders characterizes the surface flow. The major features of the area appear to be a counterclockwise rotating eddy just off Point Arguello and a seaward deflection of the California Current due to the influence of Rodriquez Dome.

The flow is northerly below 200 meters. A sluggish inflow into Santa Barbara Basin is indicated. Within the basin, flow is slow and erratic, apparently strongly influenced both by tidal and by seiche effects, but a general counterclockwise rotation is indicated.

Longshore currents transport sediments south and east along the coast (Crowell, 1952). Some sediment is discharged eastward down Arguello Canyon and its tributaries.

#### VI. ADDITIONAL WORK NEEDED IN THE AREA

Since the ocean area off Point Arguello offers a complex and changing environment, additional seasonal surveys, with close sampling grids, are needed for a thorough investigation of the currents. Time-series data to show tidal effects on water movement would provide corrections on parachute current drogues.

## VII. REFERENCES

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## APPENDIX

2	Bottom Sediment Logs
2	Plankton Summary Sheets
47	Current Drogue Summary Sheets





## PLANKTON SUMMARY (JANUARY)

[illegible]

PLANKTON SUMMARY (NOVEMBER-DECEMBER)					
Sample Number	PL#1	PL#2	PL#3	PL#4	
Date	11/26	11/26	11/28	11/28	
Time (GMT)	2010	0053	0115	1700	
Duration of tow	½ hr.	½ hr.	½ hr.	½ hr.	
Depth of sample	Surf.	Surf.	Surf.	Surf.	
Type of tow	Horz.	Horz.	Horz.	Horz.	
Ocean Station Number	18	12	9	13	
Net Volume	29 cc	40 cc	77 cc	35 cc	
COELENTERATA					
Scyphomedusae .....	45	125 (lar)	90	15	
Hydrosae:					
Siphonophora .....	5		14	5	
CERATOPHORA .....	1	175	2	1	
ECTOCOA					
(Cyphonastes) .....			2	10	
ANNELIDA					
Polychaeta .....	10		2	1	
ARTHROPODA					
Crustacea					
Copepoda:					
Euchaeta sp. ....		25	2		
Euchaeta major .....	5				
Verrillia sp. ....	5				
Rhincalanus nasutus .....	5	175	62		
Rhincalanus cornutus .....		175	14	10	
Sapphirina sp. ....	10		58		
Eubalanus elongatus .....	10			1	
Calanus sp. ....	115	1375	2250	1080	
Pontellopsis sp. ....		25	16	50	
Candacia arthropica .....		25	52	5	
Gaetanus sp. ....	5				
Corycaeus sp. ....	5				
Pleuronargus sp. ....	1205	3700	918		
Copepoda (unidentified) ..	350	25			
Amphipoda:					
Primo macron .....				1	
Vibilia sp. ....			2		
Phronima atlantica .....		7			
Phronima crassipes .....	7				
Paraphronima gracilis .....				7	
Hyperia schisogeniens .....	7				
Archylomera blossvillei .....		7			
Hyperocha medusarum .....		7			
Euphausiacea:					
Euphausia pacifica .....	1445	2325	1830	200	
Isopoda: .....					
.....		20			
Ostracoda:					
Conchoecia sp. ....			1		
Decapoda:					
(Cergeriid larvae) .....	5				
(Megalops larvae) .....	5	125			
(Unidentified larvae) ....	10	50	12	20	
Cladocera:					
Daphnia sp. ....			52		
Stomatopoda: (larvae) .....					
.....			25		
Cirripedia:					
Balanus sp. (cypris stage) ..				5	
Balanus sp. (nauplius) ....			12	6	
Arachnida (mites) .....	1				
MOLLUSCA					
Pteropoda:					
Clione sp. ....	15		8		
Cavolinia sp. ....	1	25	12		
Euforina sp. ....	45	150	1		
Neteropoda:					
Atlanta sp. ....	1				
Oetopoda: .....	1		1		
TUNICATA					
Larvacea					
Oikopleura sp. ....	30	2725	385	235	
Thaliacea					
Salpa sp. ....	5		85	40	
Doliolum sp. ....	100	75	275	225	
Pyrosoma sp. ....				1	
Invertebrate egg .....		50	8		
VERTEBRATA					
Pisces (egg) .....	15				
Pisces (larvae) Synbranchidae, et.al.	2	6		1	



## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 1 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. (W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0718/25	<sup>0</sup> 34 05.0'	<sup>0</sup> 119 59.7'	Radar	3.0	0.3	0.1
1021	<sup>0</sup> 34 05.2'	<sup>0</sup> 119 59.5'	Radar	3.1	1.2	0.4
1329	<sup>0</sup> 34 06.3'	<sup>0</sup> 119 59.6'	Radar	3.5	1.0	0.3
1800	<sup>0</sup> 34 06.5'	<sup>0</sup> 120 00.9'	Radar	2.6	1.2	0.5
1936	<sup>0</sup> 34 05.4'	<sup>0</sup> 120 01.2'	Radar	9.6	1.3	0.1
0511/26	<sup>0</sup> 34 04.9'	<sup>0</sup> 119 59.7'	Radar	18.8	1.0	0.1
0958	<sup>0</sup> 34 03.4'	<sup>0</sup> 119 59.5'	Radar			

DROGUE NO. 2 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. (W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0549/25	<sup>0</sup> 34 14.9'	<sup>0</sup> 119 58.5'	Radar	3.3	0.3	0.1
0909	<sup>0</sup> 34 14.4'	<sup>0</sup> 119 58.2'	Radar	3.1	0.8	0.3
1216	<sup>0</sup> 34 13.8'	<sup>0</sup> 119 58.9'	Radar	2.4	0.5	0.2
1440	<sup>0</sup> 34 13.5'	<sup>0</sup> 119 58.7'	Radar	3.2	1.1	0.3
1752	<sup>0</sup> 34 13.3'	<sup>0</sup> 119 59.8'	Radar	8.9	1.3	0.1
0247/26	<sup>0</sup> 34 12.8'	<sup>0</sup> 119 58.4'	Radar	20.2	1.9	0.1
2302	<sup>0</sup> 34 11.0'	<sup>0</sup> 119 57.3'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 3 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0515/25	34 13.8'	119 53.0'	Radar	3.2	1.2	0.4
0830	34 12.8'	119 53.6'	Radar	3.2	1.0	0.3
1144	34 11.7'	119 54.2'	Radar	4.1	1.2	0.3
1550	34 10.8'	119 53.3'	Radar	2.9	0.8	0.3
1847	34 10.9'	119 52.1'	Radar	9.1	2.3	0.3
0354/26	34 11.8'	119 49.5'	Radar	15.9	7.7	0.5
1949	34 18.2'	119 54.3'	Radar			

DROGUE NO. 4 Depth 50 ft. Month January Year 1964

Time/Day	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0507/25	34 13.8'	119 52.2'	Radar	3.4	1.6	0.5
0829	34 12.2'	119 52.9'	Radar	3.0	1.0	0.3
1127	34 11.2'	119 52.1'	Radar	4.0	1.0	0.2
1530	34 12.0'	119 51.2'	Radar	3.1	0.3	0.1
1836	34 12.4'	119 51.6'	Radar	9.5	3.2	0.3
0405/26	34 14.2'	119 48.4'	Radar	14.9	8.8	0.6
1902	34 16.2'	119 58.6'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 5 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0630/25	<sup>0</sup> 34 09.6'	<sup>0</sup> 119 56.5'	Radar	3.4	0.9	0.3
0952	<sup>0</sup> 34 08.6'	<sup>0</sup> 119 56.5'	Radar	3.2	0.4	0.1
1302	<sup>0</sup> 34 08.4'	<sup>0</sup> 119 56.0'	Radar	3.1	1.2	0.4
1610	<sup>0</sup> 34 08.5'	<sup>0</sup> 119 54.4'	Radar	2.8	1.7	0.6
1900	<sup>0</sup> 34 08.2'	<sup>0</sup> 119 52.4'	Radar	8.6	3.1	0.4
0335/26	<sup>0</sup> 34 08.5'	<sup>0</sup> 119 48.5'	Radar	18.4	7.9	0.4
2200	<sup>0</sup> 34 16.3'	<sup>0</sup> 119 48.5'	Radar			

DROGUE NO. 6 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2132/25	<sup>0</sup> 34 08.9'	<sup>0</sup> 120 29.4'	Radar	10.8	1.3	0.1
0821/26	<sup>0</sup> 34 07.9'	<sup>0</sup> 120 28.2'	Radar	4.3	0.5	0.1
1240	<sup>0</sup> 34 07.6'	<sup>0</sup> 120 28.8'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 7 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2217/25	<sup>0</sup> 34 13.4'	<sup>0</sup> 120 25.3'	Radar	10.7	3.0	0.3
0858/26	<sup>0</sup> 34 14.5'	<sup>0</sup> 120 28.5'	Radar	4.7	1.9	0.4
1339	<sup>0</sup> 34 16.0'	<sup>0</sup> 120 30.4'	Radar	13.6	3.2	0.2
2719	<sup>0</sup> 34 17.3'	<sup>0</sup> 120 33.9'	Radar			

DROGUE NO. 8 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2242/25	<sup>0</sup> 34 15.9'	<sup>0</sup> 120 23.2'	Radar	10.8	0.3	0
0933/26	<sup>0</sup> 34 16.0'	<sup>0</sup> 120 23.5'	Radar	4.8	0.5	0.1
1423	<sup>0</sup> 34 16.2'	<sup>0</sup> 120 23.5'	Radar	13.8	0.4	0
0412/27	<sup>0</sup> 34 16.6'	<sup>0</sup> 120 23.6'	Radar			

DROGUE NO. 9 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2310/25	<sup>0</sup> 34 19.0'	<sup>0</sup> 120 20.5'	Radar	10.8	1.3	0.1
1001/26	<sup>0</sup> 34 17.7'	<sup>0</sup> 120 19.6'	Radar	4.8	0.6	0.1
1148	<sup>0</sup> 34 17.7'	<sup>0</sup> 120 20.5'	Radar	13.9	1.3	0.1
0442/27	<sup>0</sup> 34 17.1'	<sup>0</sup> 120 19.0'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 10 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2331/25	<sup>o</sup> 34 21.6'	<sup>o</sup> 120 17.9'	Radar	11.0	1.3	0.1
1029/26	<sup>o</sup> 34 20.9'	<sup>o</sup> 120 16.6'	Radar	5.1	1.8	0.4
1533	<sup>o</sup> 34 20.0'	<sup>o</sup> 120 15.0'	Radar	13.5	2.6	0.2
0505/27	<sup>o</sup> 34 17.1'	<sup>o</sup> 120 16.2'	Radar			

DROGUE NO. 11 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2339/25	<sup>o</sup> 34 22.4'	<sup>o</sup> 120 17.5'	Radar	10.9	1.2	0.1
1032/26	<sup>o</sup> 34 21.5'	<sup>o</sup> 120 16.5'	Radar	4.7	1.1	0.2
1516	<sup>o</sup> 34 21.0'	<sup>o</sup> 120 17.6'	Radar	15.6	1.3	0.1
0652/27	<sup>o</sup> 34 20.4'	<sup>o</sup> 120 16.0'	Radar			

DROGUE NO. 12 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0001/26	<sup>o</sup> 34 24.6'	<sup>o</sup> 120 15.5'	Radar	11.0	1.4	0.1
1100	<sup>o</sup> 34 23.8'	<sup>o</sup> 120 14.2'	Radar	5.1	1.0	0.2
1608	<sup>o</sup> 34 23.8'	<sup>o</sup> 120 15.5'	Radar	13.7	2.8	0.2
0547/27	<sup>o</sup> 34 23.0'	<sup>o</sup> 120 12.4'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 13 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
1719/28	<sup>o</sup> 34 32.7'	<sup>o</sup> 120 41.9'	Radar	(hr)	(nm)	(kts)
2329	<sup>o</sup> 34 33.9'	<sup>o</sup> 120 42.0'	Radar	6.2	1.2	0.2
1945/29	<sup>o</sup> 34 31.6'	<sup>o</sup> 120 46.1'	Radar	20.3	4.2	0.2

DROGUE NO. 14 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
1648/28	<sup>o</sup> 34 30.2'	<sup>o</sup> 120 45.1'	Radar	(hr)	(nm)	(kts)
1755	<sup>o</sup> 34 30.0'	<sup>o</sup> 120 45.5'	Radar	1.1	0.2	0.2
2256	<sup>o</sup> 34 30.6'	<sup>o</sup> 120 45.1'	Radar	5.0	0.7	0.1
0003/29	<sup>o</sup> 34 30.6'	<sup>o</sup> 120 45.5'	Radar	1.1	0.3	0.3
1926	<sup>o</sup> 34 30.2'	<sup>o</sup> 120 44.9'	Radar	19.4	0.7	0

DROGUE NO. 15 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
1639/28	<sup>o</sup> 34 29.8'	<sup>o</sup> 120 45.8'	Radar	(hr)	(nm)	(kts)
1803	<sup>o</sup> 34 30.5'	<sup>o</sup> 120 46.4'	Radar	1.4	1.0	0.7
2238	<sup>o</sup> 34 28.5'	<sup>o</sup> 120 46.8'	Radar	4.6	1.8	0.4
0035/29	<sup>o</sup> 34 27.6'	<sup>o</sup> 120 47.0'	Radar	1.9	1.1	0.6
1750	<sup>o</sup> 34 23.7'	<sup>o</sup> 120 53.8'	Radar	17.2	7.0	0.4

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 16 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1608/28	<sup>o</sup> 34 27.5'	<sup>o</sup> 120 49.0'	Radar	2.4	1.2	0.5
1830	<sup>o</sup> 34 27.0'	<sup>o</sup> 120 50.1'	Radar	3.0	0.2	0.1
2129	<sup>o</sup> 34 26.7'	<sup>o</sup> 120 50.3'	Radar	3.6	0.3	0.1
0105/29	<sup>o</sup> 34 26.2'	<sup>o</sup> 120 50.5'	Radar	4.1	6.0	0.4
1510	<sup>o</sup> 34 24.4'	<sup>o</sup> 120 57.6'	Radar	2.1	1.9	0.9
1714	<sup>o</sup> 34 25.5'	<sup>o</sup> 120 59.4'	Radar			

DROGUE NO. 17 Depth 1000 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1557/28	<sup>o</sup> 34 26.6'	<sup>o</sup> 120 49.6'	Radar	2.9	0.8	0.3
1853	<sup>o</sup> 34 26.0'	<sup>o</sup> 120 49.1'	Radar	3.2	1.5	0.5
2207	<sup>o</sup> 34 25.0'	<sup>o</sup> 120 48.1'	Radar	3.3	1.1	0.3
0125/29	<sup>o</sup> 34 24.0'	<sup>o</sup> 120 48.7'	Radar	17.1	9.7	0.6
1829	<sup>o</sup> 34 22.1'	<sup>o</sup> 120 37.5'	Radar			
Note: This drogue appears to have lost its parachute very early. Thus all data are probably for a float without its parachute. Winds on the 28th were from 320°-360° and 10-20 kts.						

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 18 Depth 300 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. (W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1510/28	<sup>o</sup> 34 24.8'	<sup>o</sup> 120 53.0'	Radar	4.4	1.9	0.4
1935	<sup>o</sup> 34 25.0'	<sup>o</sup> 120 55.5'	Radar	1.3	0.7	0.5
2055	<sup>o</sup> 34 25.6'	<sup>o</sup> 120 55.9'	Radar	18.7	0.5	0
1535/29	<sup>o</sup> 34 25.9'	<sup>o</sup> 120 56.2'	Radar	0.8	1.4	1.8
1625	<sup>o</sup> 34 27.0'	<sup>o</sup> 120 57.4'	Radar			

DROGUE NO. 19 Depth 50 ft. Month January Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. (W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1422/28	<sup>o</sup> 34 21.5	<sup>o</sup> 120 58.0'	Radar	5.9	4.5	0.8
2014	<sup>o</sup> 34 25.3'	<sup>o</sup> 121 00.7'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 1 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2210/28	34 23.6'	120 00.2'	Lorac	5.9	2.5	0.4
0404/29	34 25.2'	120 02.7'	Lorac	7.0	2.0	0.3
1106	34 26.3'	120 04.8'	Lorac	4.8	1.7	0.4
1552	34 25.9'	120 06.7'	Lorac	4.7	2.4	0.5
2032	34 26.8'	120 09.3'	Radar	8.5	2.9	0.3
0500/30	34 26.3'	120 13.0'	Lorac	4.2	2.3	0.5
0913	34 27.2'	120 15.4'	Radar	4.9	3.2	0.7
1408	34 26.0'	120 19.0'	Radar			

DROGUE NO. 2 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2356/28	34 18.7'	120 06.3'	Lorac	3.4	1.8	0.5
0321/29	34 20.2'	120 07.9'	Lorac	1.5	1.0	0.7
0454	34 21.0'	120 08.3'	Lorac	6.7	2.1	0.3
1134	34 22.4'	120 10.2'	Lorac	4.7	0.8	0.2
1618	34 21.9'	120 10.8'	Lorac	4.4	3.8	0.9
2040	34 22.5'	120 15.4'	Lorac	4.5	2.6	0.6
0110/30	34 23.3'	120 18.5'	Lorac	4.0	1.4	0.4
0513	34 23.0'	120 20.2'	Lorac	4.0	3.6	0.9
0913	34 23.1'	120 24.3'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 3 Depth 500 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0100/29	<sup>o</sup> 34 13.8'	<sup>o</sup> 120 12.5'	Lorac	1.5	0.1	0.1
0229	<sup>o</sup> 34 13.8'	<sup>o</sup> 120 12.3'	Lorac	3.4	0.3	0.1
0554	<sup>o</sup> 34 13.9'	<sup>o</sup> 120 12.0'	Lorac	6.5	0.4	0.1
1224	<sup>o</sup> 34 14.3'	<sup>o</sup> 120 12.2'	Lorac	4.5	1.2	0.3
1654	<sup>o</sup> 34 14.2'	<sup>o</sup> 120 10.9'	Lorac	4.6	0.5	0.1
2128	<sup>o</sup> 34 13.7'	<sup>o</sup> 120 11.0'	Lorac	4.6	0.1	0
0206/30	<sup>o</sup> 34 13.7'	<sup>o</sup> 120 11.2'	Lorac	4.1	0.7	0.2
0611	<sup>o</sup> 34 14.3'	<sup>o</sup> 120 10.8'	Lorac	4.2	0.2	0
1021	<sup>o</sup> 34 14.4'	<sup>o</sup> 120 10.9'	Lorac	8.4	1.2	0.1
1844	<sup>o</sup> 34 14.7'	<sup>o</sup> 120 09.6'	Lorac			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 4 Depth 50 ft. Month Nov.-Dec. Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave. Vel. (kts)
0114/29	34 09.7'	120 16.7'	Lorac	4.8	1.7	0.4
0628	34 10.0'	120 14.6'	Lorac	6.1	2.3	0.4
1234	34 10.3'	120 11.9'	Lorac	4.6	1.8	0.4
1711	34 10.6'	120 09.7'	Lorac	4.6	0.4	0.1
2146	34 10.3'	120 09.2'	Lorac	4.6	1.3	0.3
0220/30	34 11.4'	120 08.6'	Lorac	4.1	1.8	0.4
0629	34 12.2'	120 06.7'	Lorac	4.2	0.2	0
1040	34 12.1'	120 06.4'	Lorac	8.3	1.2	0.1
1901	34 13.3'	120 05.9'	Lorac	6.2	0.4	0.1
0111/1	34 13.0'	120 05.5'	Lorac			

DROGUE NO. 5 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave. Vel. (kts)
0802/29	34 05.9'	119 59.8'	Lorac	5.5	1.7	0.3
1335	34 05.9'	119 57.7'	Lorac	4.5	1.2	0.3
1806	34 06.2'	119 56.3'	Radar	4.4	1.2	0.3
2228	34 06.4'	119 54.8'	Lorac	4.7	1.0	0.2
0308/30	34 06.7'	119 53.7'	Radar	3.9	0.9	0.2
0700	34 06.9'	119 52.8'	Radar	4.8	2.2	0.5
1148	34 07.3'	119 50.0'	Lorac	8.7	4.8	0.6
2028	34 07.6'	119 44.3'	Lorac			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 6 Depth 50 ft. Month Nov.-Dec. Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0844/29	<sup>0</sup> 34 11.1'	<sup>0</sup> 120 00.1'	Lorac	5.3	0.9	0.2
1102	<sup>0</sup> 34 10.6'	<sup>0</sup> 119 59.2'	Radar	4.4	0.3	0.1
1826	<sup>0</sup> 34 10.4'	<sup>0</sup> 119 59.4'	Lorac	4.4	0.9	0.2
2252	<sup>0</sup> 34 10.8'	<sup>0</sup> 120 00.3'	Lorac	4.0	0.7	0.2
0254/30	<sup>0</sup> 34 10.7'	<sup>0</sup> 119 59.5'	Lorac	4.1	0.5	0.1
0700	<sup>0</sup> 34 10.8'	<sup>0</sup> 119 58.9'	Lorac	4.2	0.3	0.1
1110	<sup>0</sup> 34 10.5'	<sup>0</sup> 119 58.9'	Lorac	8.4	1.4	0.2
1936	<sup>0</sup> 34 10.7'	<sup>0</sup> 119 57.2'	Lorac	6.6	1.6	0.2
0211/1	<sup>0</sup> 34 10.0'	<sup>0</sup> 119 55.7'	Lorac	9.7	3.1	0.3
1156	<sup>0</sup> 34 08.2'	<sup>0</sup> 119 52.4'	Lorac			

DROGUE NO. 7 Depth 300 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0928/29	<sup>0</sup> 34 15.1'	<sup>0</sup> 119 55.6'	Lorac	5.0	2.1	0.4
1128	<sup>0</sup> 34 16.0'	<sup>0</sup> 119 57.7'	Lorac	4.5	1.3	0.3
1859	<sup>0</sup> 34 17.1'	<sup>0</sup> 119 58.8'	Lorac	4.4	1.4	0.3
2324	<sup>0</sup> 34 17.3'	<sup>0</sup> 120 00.5'	Radar	0.6	0.2	0.3
2358	<sup>0</sup> 34 17.3'	<sup>0</sup> 120 00.7'	Lorac	4.1	1.4	0.3
0404/30	<sup>0</sup> 34 17.9'	<sup>0</sup> 120 02.1	Lorac	3.6	1.4	0.4
0743	<sup>0</sup> 34 18.8'	<sup>0</sup> 120 03.4'	Radar	5.6	2.6	0.5
1320	<sup>0</sup> 34 21.1'	<sup>0</sup> 120 05.3'	Lorac	10.5	6.7	0.6
2350	<sup>0</sup> 34 26.2'	<sup>0</sup> 120 10.2'	Radar			

DROGUE NO. 8 Depth 50 ft. Month November Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0958/29	<sup>0</sup> 34 18.0'	<sup>0</sup> 119 51.6'	Lorac	4.8	1.6	0.3
1448	<sup>0</sup> 34 18.1'	<sup>0</sup> 119 53.5'	Lorac	4.4	1.5	0.3
1915	<sup>0</sup> 34 18.2'	<sup>0</sup> 119 55.3'	Lorac	4.1	1.8	0.4
2324	<sup>0</sup> 34 18.0'	<sup>0</sup> 119 57.7'	Radar	0.3	0.2	0.7
2343	<sup>0</sup> 34 17.9'	<sup>0</sup> 119 57.8'	Lorac	4.3	1.7	0.4
0404/30	<sup>0</sup> 34 18.7'	<sup>0</sup> 119 59.6'	Radar	3.6	1.2	0.3
0743	<sup>0</sup> 34 19.5'	<sup>0</sup> 120 00.7'	Lorac	5.4	1.6	0.3
1306	<sup>0</sup> 34 19.4'	<sup>0</sup> 120 02.6'	Lorac	10.4	4.1	0.4
2333	<sup>0</sup> 34 20.9'	<sup>0</sup> 120 07.2'	Lorac			

DROGUE NO. 9 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1630/1	<sup>0</sup> 34 15.1'	<sup>0</sup> 120 35.0'	Lorac	0.8	0.7	0.9
1720	<sup>0</sup> 34 14.7'	<sup>0</sup> 120 34.5'	Radar	5.6	2.9	0.5
2254	<sup>0</sup> 34 11.8'	<sup>0</sup> 120 34.2'	Lorac	4.3	1.4	0.3
0310/2	<sup>0</sup> 34 10.4'	<sup>0</sup> 120 34.9'	Lorac	6.3	1.2	0.2
0928	<sup>0</sup> 34 09.3'	<sup>0</sup> 120 34.6'	Lorac	4.6	1.3	0.3
1407	<sup>0</sup> 34 07.9'	<sup>0</sup> 120 34.2'	Lorac	2.7	1.6	0.6
1644	<sup>0</sup> 34 07.3'	<sup>0</sup> 120 32.6'	Radar	3.4	1.8	0.5
2008	<sup>0</sup> 34 05.5'	<sup>0</sup> 120 32.2'	Radar	2.8	1.4	0.5
2255	<sup>0</sup> 34 04.3'	<sup>0</sup> 120 33.1'	Radar	5.2	0.7	0.1
0410/3	<sup>0</sup> 34 04.2'	<sup>0</sup> 120 33.8'	Lorac			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 10 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. ( W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1716/1	34 11.2'	120 39.2'	Lorac	4.5	3.2	0.7
2148	34 07.9'	120 39.6'	Lorac	1.7	2.8	1.6
2330	34 05.3'	120 39.9'	Lorac	0.6	1.0	1.7
0004/2	34 04.7'	120 38.8'	Lorac	2.4	2.1	0.9
0230	34 02.9'	120 37.3'	Lorac	3.3	4.7	1.4
0548	33 58.4'	120 36.5'	Radar	1.7	1.2	0.7
0728	33 57.3'	120 35.7'	Lorac	7.9	6.6	0.8
1526	33 52.1'	120 30.8'	Lorac			
Note: This drogue is believed to have lost its parachute very early. All data are probably due to wind drift.						

DROGUE NO. 11 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. ( W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1756/1	34 07.4'	120 43.4'	Lorac	2.7	0.2	0.1
2038	34 07.6'	120 43.2'	Lorac	5.5	0.8	0.1
0206/2	34 08.1'	120 42.8'	Lorac	1.1	0.1	0.1
0310	34 08.2'	120 42.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 12 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave. Vel. (kts)
1756/1	<sup>o</sup> 34 07.4'	<sup>o</sup> 120 43.4'	Lorac	2.5	0.9	0.4
2028	<sup>o</sup> 34 06.7'	<sup>o</sup> 120 44.2'	Lorac	0.5	0.3	0.6
2100	<sup>o</sup> 34 06.7'	<sup>o</sup> 120 44.6'	Radar	2.5	1.2	0.5
2330	<sup>o</sup> 34 05.5'	<sup>o</sup> 120 44.2'	Lorac	1.1	0.8	0.7
0034/2	<sup>o</sup> 34 05.3'	<sup>o</sup> 120 45.2'	Lorac	1.9	1.5	0.8
0230	<sup>o</sup> 34 04.5'	<sup>o</sup> 120 46.7'	Lorac	1.6	1.0	0.6
0404	<sup>o</sup> 34 04.5'	<sup>o</sup> 120 47.8'	Lorac	7.6	3.5	0.5
1138	<sup>o</sup> 34 07.3'	<sup>o</sup> 120 50.4'	Lorac	1.0	0.1	0.1
1238	<sup>o</sup> 34 07.2'	<sup>o</sup> 120 50.3'	Lorac	6.5	2.3	0.4
1907	<sup>o</sup> 34 09.2'	<sup>o</sup> 120 51.8'	Lorac	3.4	0.9	0.3
2230	<sup>o</sup> 34 09.8'	<sup>o</sup> 120 51.2'	Lorac	4.1	0.6	0.1
0234/3	<sup>o</sup> 34 09.1'	<sup>o</sup> 120 51.1'	Lorac	4.2	1.4	0.3
0648	<sup>o</sup> 34 09.3'	<sup>o</sup> 120 52.7'	Lorac	5.6	0.8	0.1
1222	<sup>o</sup> 34 10.2'	<sup>o</sup> 120 53.1'	Lorac	0.9	0.1	0.1
1318	<sup>o</sup> 34 10.0'	<sup>o</sup> 120 53.2'	Lorac	1.0	0.1	0.1
1419	<sup>o</sup> 34 09.8'	<sup>o</sup> 120 53.2'	Lorac	0.8	0.4	0.5
1509	<sup>o</sup> 34 09.7'	<sup>o</sup> 120 53.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 13 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
	<sup>o</sup>	<sup>o</sup>		(hr)	(nm)	(kts)
1911/1	34 00.7'	120 51.0'	Lorac	6.3	0.8	0.1
0130/2	34 00.7'	120 51.9'	Lorac	2.7	1.3	0.5
0410	34 01.0'	120 53.3'	Radar	0.6	0.4	0.7
0446	34 01.3'	120 53.6'	Lorac	6.3	2.2	0.3
1104	34 03.5'	120 53.2'	Lorac	7.4	2.1	0.3
1826	34 04.7'	120 55.3'	Lorac	3.4	1.5	0.4
2152	34 06.1'	120 54.7'	Lorac	4.2	1.2	0.3
0205/3	34 07.0'	120 55.7'	Lorac	4.3	1.3	0.3
0621	34 08.2'	120 56.2'	Lorac	6.5	1.9	0.3
1252	34 10.2'	120 57.0'	Lorac	1.0	0.2	0.2
1351	34 10.1'	120 57.1'	Lorac	0.9	0.1	0.1
1445	34 10.0'	120 57.0'	Lorac	0.8	0.3	0.4
1536	34 10.0'	120 56.7'	Lorac			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 14 Depth 50 ft. Month December Year 1964

Time/Day	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave. Vel. (kts)
1838/1	<sup>o</sup> 34 03.7'	<sup>o</sup> 120 47.8'	Lorac	1.3	0.4	0.3
1955	<sup>o</sup> 34 04.2'	<sup>o</sup> 120 47.9'	Lorac	4.6	1.1	0.2
0030/2	<sup>o</sup> 34 03.9'	<sup>o</sup> 120 49.1'	Radar	0.5	0.2	0.4
0102	<sup>o</sup> 34 03.8'	<sup>o</sup> 120 49.3'	Lorac	1.1	0.7	0.6
0206	<sup>o</sup> 34 03.4'	<sup>o</sup> 120 49.8'	Lorac	2.6	2.8	1.1
0440	<sup>o</sup> 34 01.7'	<sup>o</sup> 120 52.4'	Lorac			

DROGUE NO. 15 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave. Vel. (kts)
1843/3	<sup>o</sup> 34 02.3'	<sup>o</sup> 121 16.9'	Lorac	6.0	6.6	1.1
0046/4	<sup>o</sup> 33 56.9'	<sup>o</sup> 121 21.5'	Lorac	6.3	4.7	0.7
0705	<sup>o</sup> 33 52.7'	<sup>o</sup> 121 24.0'	Lorac	7.7	7.2	0.9
1450	<sup>o</sup> 33 45.5'	<sup>o</sup> 121 25.2'	Lorac	6.6	1.7	0.3
2126	<sup>o</sup> 33 44.9'	<sup>o</sup> 121 24.8'	Radar	7.6	5.4	0.7
0500/5	<sup>o</sup> 33 39.4'	<sup>o</sup> 121 24.6'	Radar	7.6	1.5	0.2
1238	<sup>o</sup> 33 37.0'	<sup>o</sup> 121 24.1'	Lorac	7.2	0.7	0.1
1948	<sup>o</sup> 33 36.7'	<sup>o</sup> 121 24.8'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 16 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
1936/3	<sup>o</sup> 34 06.1'	<sup>o</sup> 121 12.1'	Lorac	0.8	1.2	1.5
2027	<sup>o</sup> 34 05.2'	<sup>o</sup> 121 13.2'	Radar	0.2	0.2	1.0
2042	<sup>o</sup> 34 05.1'	<sup>o</sup> 121 13.4'	Radar	2.7	2.7	1.0
2322	<sup>o</sup> 34 02.8'	<sup>o</sup> 121 15.2'	Radar	0.7	0.6	0.9
0002/4	<sup>o</sup> 34 02.6'	<sup>o</sup> 121 15.7'	Lorac	1.5	1.3	0.9
0134	<sup>o</sup> 34 01.7'	<sup>o</sup> 121 16.7'	Lorac	4.8	3.6	0.8
0622	<sup>o</sup> 33 59.5'	<sup>o</sup> 121 20.2'	Lorac	1.5	1.0	0.7
0753	<sup>o</sup> 33 59.1'	<sup>o</sup> 121 21.3'	Lorac	5.9	2.9	0.5
1347	<sup>o</sup> 33 56.9'	<sup>o</sup> 121 23.6'	Lorac	7.3	5.7	0.8
2105	<sup>o</sup> 33 51.7'	<sup>o</sup> 121 26.6'	Lorac	6.6	3.8	0.6
0342/5	<sup>o</sup> 33 49.2'	<sup>o</sup> 121 29.9'	Lorac	7.6	3.5	0.5
1117	<sup>o</sup> 33 47.7'	<sup>o</sup> 121 33.7'	Lorac	10.5	5.7	0.5
2150	<sup>o</sup> 33 44.0'	<sup>o</sup> 121 39.0'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 17 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N )	Long. (W )		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2024/3	34 09.9'	121 07.8'	Lorac			
	°	°		2.8	2.2	0.8
2312	34 07.7'	121 07.8'	Lorac			
	°	°		3.6	0.2	0.1
0246/4	34 07.8'	121 07.9'	Lorac			
	°	°		2.2	0.5	0.2
0456	34 07.6'	121 08.3'	Lorac			
	°	°		4.8	1.1	0.2
0944	34 06.6'	121 08.7'	Lorac			
	°	°		1.9	0.4	0.2
1138	34 06.2'	121 08.6'	Lorac			
	°	°		6.2	2.0	0.3
1750	34 04.2'	121 08.1'	Lorac			
	°	°		1.3	0.8	0.6
1906	34 03.5'	121 08.3'	Lorac			
	°	°		4.9	1.6	0.3
2358	34 02.0'	121 08.7'	Lorac			
	°	°		1.5	0.7	0.5
0129/5	34 01.5'	121 09.3'	Lorac			
	°	°		5.8	0.5	0.1
0716	34 01.1'	121 09.5'	Lorac			
	°	°		1.4	0.2	0.1
0838	34 00.9'	121 09.4'	Lorac			
	°	°		6.8	2.4	0.4
1521	33 58.4'	121 09.6'	Lorac			
	°	°		1.9	0.8	0.4
1713	33 57.7'	121 10.0'	Lorac			
	°	°				

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 18 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2022/3	34 10.0'	121 07.7'	Lorac	2.7	1.25	0.5
2304	34 08.9'	121 07.0'	Lorac	3.4	3.8	1.1
0227/4	34 05.6'	121 09.3'	Lorac	2.9	2.2	0.8
0524	34 03.7'	121 10.7'	Lorac			

DROGUE NO. 19 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2105/3	34 13.0'	121 03.4'	Lorac	1.5	1.1	0.7
2236	34 12.0'	121 03.7'	Lorac	4.6	2.7	0.6
0310/4	34 09.3'	121 03.9'	Lorac	1.4	0.9	0.6
0434	34 08.5'	121 04.5'	Lorac	4.9	3.1	0.6
0929	34 05.8'	121 06.6'	Lorac	2.4	2.2	0.9
1154	34 03.8'	121 07.5'	Lorac	5.3	5.3	1.0
1713	33 58.8'	121 09.8'	Lorac	2.4	1.5	0.6
1940	33 57.4'	121 09.9'	Lorac	3.6	1.9	0.5
2315	33 55.6'	121 10.6'	Lorac	2.9	1.9	0.7
0212/5	33 53.8'	121 11.5'	Lorac	4.1	2.2	0.5
0616	33 51.7'	121 12.6'	Lorac	3.5	1.9	0.5
0946	33 50.1'	121 13.6'	Lorac	4.3	2.8	0.6
1403	33 47.7'	121 15.3'	Lorac	5.7	2.1	0.4
1946	33 45.5'	121 15.2'	Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 20 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
2149/3	34 17.1'	120 59.6'	Lorac	6.1	2.7	0.4
0353/4	34 14.7'	121 01.0'	Lorac	6.8	2.2	0.3
1041	34 13.7'	121 03.5'	Lorac	7.8	4.9	0.6
1827	34 08.9'	121 05.2'	Lorac	6.2	1.7	0.3
0042/5	34 07.6'	121 04.9'	Lorac	7.2	1.6	0.2
0756	34 06.1'	121 04.6'	Lorac	8.5	0.9	0.1
1627	34 05.3'	121 04.3'	Lorac			

DROGUE NO. 21 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0219/6	34 20.8'	120 55.5'	Radar	7.7	4.7	0.6
1000	34 17.4'	120 51.6'	Radar	3.1	2.2	0.7
1306	34 16.7'	120 49.1'	Lorac	4.0	1.8	0.5
1706	34 15.7'	120 47.2'	Lorac	4.8	1.9	0.4
2152	34 16.2'	120 45.0'	Lorac	5.2	1.8	0.4
0303/7	34 16.3'	120 42.8'	Lorac	5.7	1.7	0.3
0843	34 15.4'	120 41.1'	Lorac	5.5	0.8	0.1
1416	34 15.3'	120 41.2'	Lorac	5.8	2.3	0.4
2005	34 13.7'	120 38.1'	Lorac	5.8	2.1	0.4
0152/8	34 12.6'	120 36.1'	Lorac	7.5	2.6	0.3
0922	34 11.3'	120 33.3'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 22 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0258/6	<sup>o</sup> 34 24.7'	<sup>o</sup> 120 50.8'	Radar	6.5	0.4	0.1
0927	<sup>o</sup> 34 24.5'	<sup>o</sup> 120 51.2'	Radar	4.4	1.4	0.3
1351	<sup>o</sup> 34 25.7'	<sup>o</sup> 120 50.3'	Lorac	2.1	0.5	0.2
1555	<sup>o</sup> 34 25.8'	<sup>o</sup> 120 49.6'	Lorac	2.6	0.2	0.1
1830	<sup>o</sup> 34 25.8'	<sup>o</sup> 120 49.4'	Lorac	2.1	0.3	0.1
2037	<sup>o</sup> 34 25.7'	<sup>o</sup> 120 49.7'	Lorac	2.7	0.8	0.3
2322	<sup>o</sup> 34 26.5'	<sup>o</sup> 120 50.0'	Lorac	2.1	0.9	0.4
0131/7	<sup>o</sup> 34 27.4'	<sup>o</sup> 120 50.2'	Lorac	3.3	1.1	0.3
0450	<sup>o</sup> 34 28.3'	<sup>o</sup> 120 50.8'	Lorac	2.0	0.2	0.1
0651	<sup>o</sup> 34 28.5'	<sup>o</sup> 120 50.8'	Lorac	4.6	1.6	0.3
1125	<sup>o</sup> 34 29.1'	<sup>o</sup> 120 52.5'	Lorac	5.4	1.3	0.2
1652	<sup>o</sup> 34 29.8'	<sup>o</sup> 120 53.8'	Lorac	0.7	0.2	0.3
1737	<sup>o</sup> 34 29.8'	<sup>o</sup> 120 53.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 23 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time	Dist.	Ave.Vel.
	<sup>o</sup>	<sup>o</sup>		(hr)	(nm)	(kts)
0258/6	34 24.7'	120 50.8'	Radar	6.6	0.5	0.1
0932	<sup>o</sup> 34 25.2'	<sup>o</sup> 120 51.1'	Radar	4.4	1.3	0.3
1354	<sup>o</sup> 34 26.2'	<sup>o</sup> 120 50.3'	Lorac	1.9	0.2	0.1
1550	<sup>o</sup> 34 26.3'	<sup>o</sup> 120 50.2'	Lorac	3.8	0.2	0.1
1936	<sup>o</sup> 34 26.5'	<sup>o</sup> 120 50.0'	Lorac	0.9	0	0
2030	<sup>o</sup> 34 26.5'	<sup>o</sup> 120 50.0'	Lorac	2.9	0.6	0.2
2323	<sup>o</sup> 34 26.8'	<sup>o</sup> 120 50.5'	Lorac	2.0	0.6	0.3
0125/7	<sup>o</sup> 34 27.2'	<sup>o</sup> 120 51.0'	Lorac	3.5	0.9	0.3
0456	<sup>o</sup> 34 28.0'	<sup>o</sup> 120 51.3'	Lorac	1.8	0.2	0.1
0647	<sup>o</sup> 34 28.2'	<sup>o</sup> 120 51.5'	Lorac	4.5	0.8	0.2
1118	<sup>o</sup> 34 28.9'	<sup>o</sup> 120 51.9'	Lorac	5.4	0.7	0.1
1644	<sup>o</sup> 34 29.4'	<sup>o</sup> 120 52.3'	Lorac	1.1	0.1	0.1
1749	<sup>o</sup> 34 29.3'	<sup>o</sup> 120 52.4'	Lorac	5.0	0.4	0.1
2250	<sup>o</sup> 34 29.5'	<sup>o</sup> 120 52.9'	Lorac	6.8	1.0	0.1
0536/8	<sup>o</sup> 34 30.6'	<sup>o</sup> 120 52.7'	Lorac	6.3	0.8	0.1
1152	<sup>o</sup> 34 30.8'	<sup>o</sup> 120 51.7'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 24 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0334/6	<sup>0</sup> 34 28.3'	<sup>0</sup> 120 46.4'	Radar	5.4	1.7	0.3
0858	<sup>0</sup> 34 29.4'	<sup>0</sup> 120 48.0'	Radar	5.3	1.4	0.3
1415	<sup>0</sup> 34 30.4'	<sup>0</sup> 120 49.2'	Lorac	1.0	0.5	0.5
1514	<sup>0</sup> 34 30.6'	<sup>0</sup> 120 49.7'	Lorac	4.0	1.4	0.4
1916	<sup>0</sup> 34 30.9'	<sup>0</sup> 120 51.5'	Lorac	4.8	2.9	0.6
0005/7	<sup>0</sup> 34 30.5'	<sup>0</sup> 120 54.9'	Lorac	0.7	0.9	1.3
0048	<sup>0</sup> 34 30.7'	<sup>0</sup> 120 55.9'	Lorac	4.5	2.0	0.4
0520	<sup>0</sup> 34 29.0'	<sup>0</sup> 120 54.7'	Lorac	1.1	1.2	1.1
0628	<sup>0</sup> 34 28.0'	<sup>0</sup> 120 54.1'	Lorac	4.2	3.6	0.9
1042	<sup>0</sup> 34 24.6'	<sup>0</sup> 120 52.7'	Lorac	2.1	1.6	0.8
1251	<sup>0</sup> 34 24.2'	<sup>0</sup> 120 50.8'	Lorac	3.0	1.9	0.6
1552	<sup>0</sup> 34 24.1'	<sup>0</sup> 120 48.5'	Lorac	2.9	1.6	0.6
1844	<sup>0</sup> 34 23.3'	<sup>0</sup> 120 46.8'	Lorac	2.9	1.4	0.5
2136	<sup>0</sup> 34 22.3'	<sup>0</sup> 120 45.7'	Lorac	5.7	2.3	0.4
0321/8	<sup>0</sup> 34 20.8'	<sup>0</sup> 120 43.5'	Lorac	4.6	3.0	0.7
0758	<sup>0</sup> 34 18.1'	<sup>0</sup> 120 42.0'	Lorac			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 25 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0412/6	<sup>0</sup> 34 32.0'	<sup>0</sup> 120 42.0'	Radar	4.1	1.7	0.4
0819	<sup>0</sup> 34 33.0'	<sup>0</sup> 120 43.7'	Radar	6.4	5.4	0.8
1443	<sup>0</sup> 34 34.5'	<sup>0</sup> 120 50.0'	Lorac	4.9	2.7	0.6
1936	<sup>0</sup> 34 34.6'	<sup>0</sup> 120 53.3'	Lorac	4.8	2.2	0.5
0027/7	<sup>0</sup> 34 33.7'	<sup>0</sup> 120 55.6'	Lorac	5.4	1.4	0.3
0551	<sup>0</sup> 34 32.4'	<sup>0</sup> 120 55.0'	Lorac	6.0	2.8	0.5
1152	<sup>0</sup> 34 30.2'	<sup>0</sup> 120 57.0'	Lorac	5.3	0.8	0.2
1710	<sup>0</sup> 34 29.5'	<sup>0</sup> 120 56.9'	Lorac	6.5	5.0	0.8
2340	<sup>0</sup> 34 25.4'	<sup>0</sup> 120 53.3'	Lorac	4.6	2.8	0.6
0418/8	<sup>0</sup> 34 25.2'	<sup>0</sup> 120 50.0'	Lorac Radar	2.4	1.7	0.7
0645	<sup>0</sup> 34 24.7'	<sup>0</sup> 120 48.0'	Lorac Radar			

## CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 26 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0724/9	<sup>0</sup> 34 51.7'	<sup>0</sup> 121 01.4'	Radar	4.3	0.3	0.1
1140	<sup>0</sup> 34 51.6'	<sup>0</sup> 121 01.8'	Radar			
1423	<sup>0</sup> 34 51.9'	<sup>0</sup> 121 01.7'	Radar	2.7	0.4	0.1
				8.6	0.8	0.1
2300	<sup>0</sup> 34 52.0'	<sup>0</sup> 121 02.5'	Radar	2.2	0	0
0113/10	<sup>0</sup> 34 52.0'	<sup>0</sup> 121 02.5'	Radar	1.9	0.4	0.2
0306	<sup>0</sup> 34 52.3'	<sup>0</sup> 121 02.9'	Radar	2.0	0.4	0.2
0506	<sup>0</sup> 34 52.7'	<sup>0</sup> 121 03.1'	Radar	2.6	0.6	0.2
0745	<sup>0</sup> 34 52.9'	<sup>0</sup> 121 03.7'	Radar	4.6	0.5	0.1
1219	<sup>0</sup> 34 53.3'	<sup>0</sup> 121 03.4'	Radar			

DROGUE NO. 27 Depth 500 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0730/9	<sup>0</sup> 34 51.6'	<sup>0</sup> 121 01.3'	Radar	4.3	0.8	0.2
1150	<sup>0</sup> 34 52.4'	<sup>0</sup> 121 01.0'	Radar			
1423	<sup>0</sup> 34 52.8'	<sup>0</sup> 121 01.0'	Radar	12.4	1.5	0.1
0245/10	<sup>0</sup> 34 54.2'	<sup>0</sup> 121 00.4'	Radar	3.0	0.7	0.2
0545	<sup>0</sup> 34 54.9'	<sup>0</sup> 120 59.9'	Radar	4.2	0.6	0.1
0957	<sup>0</sup> 34 54.9'	<sup>0</sup> 120 59.3'	Radar	3.0	0.4	0.1
1300	<sup>0</sup> 34 55.2'	<sup>0</sup> 120 58.9'	Radar			

CURRENT DROGUE SUMMARY SHEET

DROGUE NO. 28 Depth 50 ft. Month December Year 1964

Time/Day Zulu	Position		Type Control	Observation Interval		
	Lat. (N)	Long. (W)		Time (hr)	Dist. (nm)	Ave.Vel. (kts)
0800/9	<sup>0</sup> 34 53.7'	<sup>0</sup> 120 57.4'	Radar	4.2	0.2	0
1214	<sup>0</sup> 34 53.8'	<sup>0</sup> 120 57.2'	Radar	1.6	0.3	0.2
1352	<sup>0</sup> 34 53.7'	<sup>0</sup> 120 56.8'	Radar	1.4	0.6	0.4
1514	<sup>0</sup> 34 53.2'	<sup>0</sup> 120 56.1'	Radar	1.3	0.5	0.4
1634	<sup>0</sup> 34 52.9'	<sup>0</sup> 120 56.2'	Radar	2.2	0.8	0.4
1846	<sup>0</sup> 34 52.1'	<sup>0</sup> 120 56.6'	Radar	3.5	0.3	0.1
2217	<sup>0</sup> 34 52.0'	<sup>0</sup> 120 56.3'	Radar	2.1	0.2	0.1
0021/10	<sup>0</sup> 34 52.3'	<sup>0</sup> 120 56.3'	Radar	1.7	0.7	0.4
0205	<sup>0</sup> 34 52.4'	<sup>0</sup> 120 55.5'	Radar	2.0	0.7	0.4
0405	<sup>0</sup> 34 52.1'	<sup>0</sup> 120 54.8'	Radar	2.6	0.9	0.3
0642	<sup>0</sup> 34 51.3'	<sup>0</sup> 120 54.4'	Radar	4.3	0.6	0.1
1100	<sup>0</sup> 34 50.8'	<sup>0</sup> 120 54.0'	Radar			



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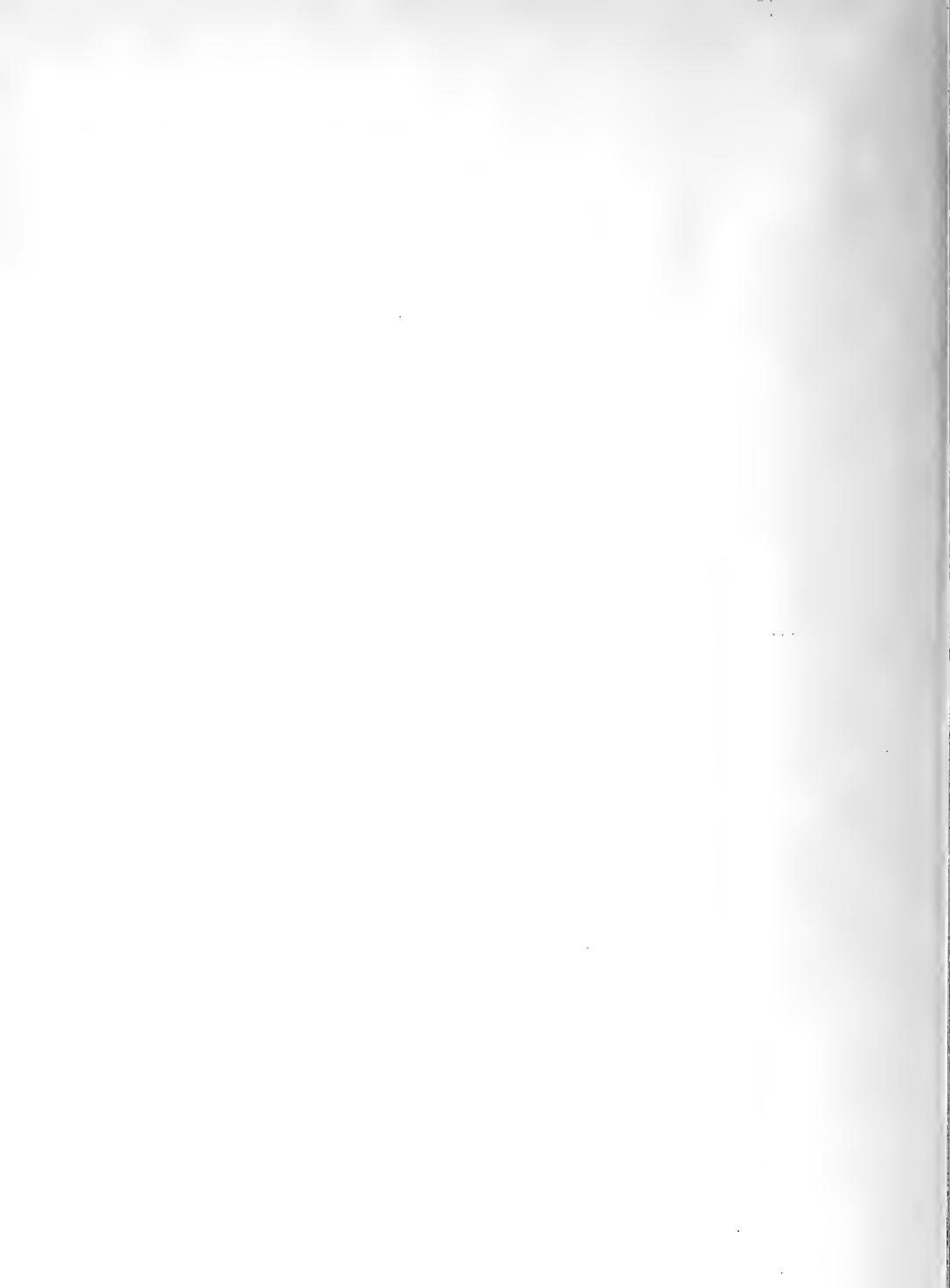
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## DOCUMENT CONTROL DATA - R &amp; D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U.S. NAVAL OCEANOGRAPHIC OFFICE		UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE			
OCEANOGRAPHIC SURVEY RESULTS OFF POINT ARGUELLO, CALIFORNIA JANUARY AND NOVEMBER-DECEMBER 1964			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Technical Report: 21 to 28 January and 25 November to 10 December 1964			
5. AUTHOR(S) (First name, middle initial, last name)			
ROBERT W. THOMAS			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1968		53	6
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 202-01		TR 201	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT			
U.S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users mail request through: Commander, U.S. Naval Oceanographic Office, Washington, D.C. 20390 ATTN: Code 40			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
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## 13. ABSTRACT

NAVOCEANO conducted two oceanographic surveys in the ocean area off Point Arguello, California, one in January and one in November-December 1964. The primary purpose of the surveys was to investigate the currents of the area; however, standard Nansen casts were taken, and bottom sediment and plankton samples were obtained.

Parachute current drogues were principally used to describe current movement off Point Arguello. A strong westerly flow along the northern portion of Santa Barbara Channel was noted in the surface layers. A corresponding easterly flowing current also was noted in the southern portion of the channel.

The major features of the surface flow appeared to be a counterclockwise rotating eddy just off Point Arguello and a deflection of the California Current due to the influence of Rodriquez Dome.

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KEY WORDS

OCEANOGRAPHY  
POINT ARGUELLO  
CURRENTS  
CALIFORNIA CURRENT SYSTEM  
USS REHOBOTH (AGS 50)

LINK A

LINK B

LINK C

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